RPS Planning, Transport and Environment

INDEX DATA	RPS INFORMATION
Scheme Title A1 : Dishforth - North of Leeming Improvements	Details Report on Geophysical survey.
Road Number A1	Date March 1995
Contractor A.W+P.	
County North Yorkshire.	
OS Reference SE29.	
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REPORT ON GEOPHYISCAL SURVEY

A1 DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39

Report number 95/29

Work commissioned by :

ANTHONY WALKER AND PARTNERS

SITE SUMMARY SHEET

95\29 A1 Dishforth-North of Leeming: Area 39

NGR: SE 275 917

Location, topography and geology

Area 39 lies on the western side of the A1 Trunk road at the northern end of the evaluation corridor, approximately 2km north of Leeming Bar. Four blocks, occupying undulating arable land, were investigated; these were placed immediately adjacent to an area of previous geophysical survey (GSB 1994). The geology comprises deep, well drained coarse loamy and sandy soils over gravels formed from a parent of glacio-fluvial/river terrace drift.

Archaeology

Detailed fieldwalking in Area 39 commissioned by Anthony Walker and Partners (AWP) suggested that the field may contain buried archaeology. The results of the previous geophysical survey (*ibid.*) indicated several possible archaeological anomalies.

Aims of Survey

The current work forms a continuation of the previous gradiometer survey, with the aim of identifying any further anomalies of archaeological interest.

Summary of Results *

The results of the survey reveal generally low levels of magnetic response. A few ditch and pit type anomalies were detected, but the poor definition of these responses makes an archaeological interpretation tentative.

*** It is essential that this summary is read in conjunction with the detailed results of the survey.**

 For the use of A. Walker & Partners

SURVEY RESULTS

95 / 29 A1 Dishforth-North of Leeming: Area 39

1. Survey Area (Figures 1&2)

1.1 Four blocks (C-F), totalling 1.16ha were surveyed by gradiometry. For display purposes one of these areas (F) has been subdivided. The grids were positioned adjacent to the area of previous geophysical survey at the site (Areas 39A & B *ibid.*). The approximate position of Area 39 is given in Figure 1 at a scale of 1:50000.

1.2. The survey grids were set out and tied in to existing field boundaries by staff of AWP using an EDM system. The tie-in information forms the basis of a detailed location diagram, Figure 2, produced at 1:2000.

2. Display

2.1 The results are displayed as X-Y traces, dot density plots and grey scale images. These display formats are discussed in the *Technical Information* section, at the end of the text.

2.2 Figure 3 presents a summary interpretation at 1:2000, showing all the gradiometer anomalies detected in Area 39. Results for each block of the current survey are produced at 1:500, accompanied by interpretations at the same scale (Figures C1-F2).

3. General Considerations - Complicating factors

3.1 Conditions for survey were generally good, the ground being under a young crop and free of obstructions. Area C occupied a steep slope, which made walking with the instrument difficult; however this does not appear to have unduly affected the results.

3.2 Numerous small scale ferrous responses were noted in all survey areas. These are attributed to scatters of ferrous debris, of presumed modern origin, buried in the topsoil, and are not referred to in the discussion of the results below.

4. Results of Survey (Figures 3, C1-F2)

4.1 *Area C.* A broad curving anomaly was detected in the southern corner of this block. While it could represent an archaeological ditch, the diffuse nature of the response might suggest a natural or modern origin. A short ditch type anomaly was also noted, though again, an archaeological interpretation for this is tentative. An area of magnetic noise at the southern edge of the grid has been caused by an adjacent wire boundary fence.

4.2 *Area D.* A possible pit and a short length of ditch are the sole anomalies of archaeological potential in this area. Natural or modern origins for both these responses cannot be ruled out.

4.3 *Area E.* No anomalies of archaeological interest are apparent in this data set.

4.4 *Area F.* Several pit type responses have been noted, which might be archaeological in nature; however, they could equally be the product of more deeply buried ferrous material.

5. Conclusions

The results of the current work are comparable to those obtained for Area 39 in the 1994 survey. In both cases, the general levels of magnetic response were low, with archaeological type anomalies tending to be weak and poorly defined and interpretation therefore being tentative.

Project Co-ordinator: C Stephens
Project Assistants: Dr C F Gaffney & A Shields

References:

GSB 94/103: Report on Geophysical Survey *A1 Dishforth to North of Leeming Improvements.*

TECHNICAL INFORMATION

The following is a description of the equipment and display formats used in **GEOPHYSICAL SURVEYS OF BRADFORD** reports. It should be emphasised that whilst all of the display options are regularly used, the diagrams produced in the final reports are the most suitable to illustrate the data from each site. The choice of diagrams results from the experience and knowledge of the staff of **GEOPHYSICAL SURVEYS OF BRADFORD**.

All survey reports are prepared and submitted on the basis that whilst they are based on a thorough survey of the site, no responsibility is accepted for any errors or omissions.

Magnetic readings are logged at 0.5m intervals along one axis in 1m traverses giving 800 readings per 20m x 20m grid, unless otherwise stated. Resistance readings are logged at 1m intervals giving 400 readings per 20m x 20m grid. The data are then transferred to portable computers and stored on 3.5" floppy discs. Field plots are produced on a portable Hewlett Packard Thinkjet. Further processing is carried out back at base on computers linked to appropriate printers and plotters.

Instrumentation

(a) Fluxgate Gradiometer - Geoscan FM36

This instrument comprises of two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally features up to one metre deep may be detected by this method.

(b) Resistance Meter - Geoscan RM4 or RM15

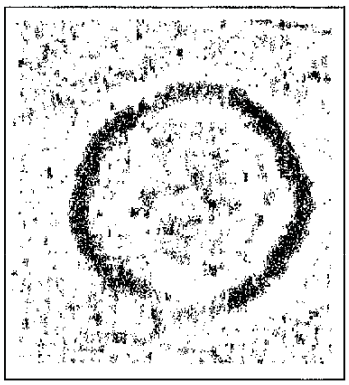
This measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential.) Depending on the arrangement of these electrodes an exact measurement of a specific volume of earth may be acquired. This resistance value may then be used to calculate the earth resistivity. The "Twin Probe" arrangement involves the paring of electrodes (one current and one potential) with one pair remaining in a fixed position, whilst the other measures the resistance variations across a fixed grid. The resistance is measured in Ohms and the calculated resistivity is in Ohm-metres. The resistance method as used for area survey has a depth resolution of approximately 0.75m, although the nature of the overburden and underlying geology will cause variations in this generality. The technique can be adapted to sample greater depths of earth and can therefore be used to produce vertical "pseudo sections".

(c) Magnetic Susceptibility

Variations in the magnetic susceptibility of subsoils and topsoils occur naturally, but greater enhanced susceptibility can also be a product of increased human/anthropogenic activity. This phenomenon of susceptibility enhancement can therefore be used to provide information about the "level of archaeological activity" associated with a site. It can also be used in a predictive manner to ascertain the suitability of a site for a magnetic survey. The instrument employed for measuring this phenomenon is either a field coil or a laboratory based susceptibility bridge. For the latter 50g soil samples are collected in the field.

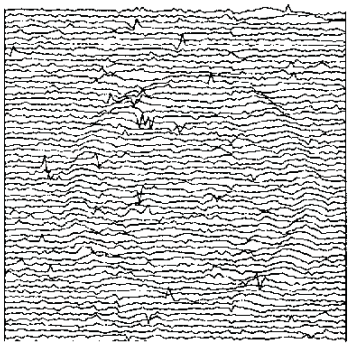
Display Options

The following is a description of the display options used. Unless specifically mentioned in the text, it may be assumed that no filtering or smoothing has been used to enhance the data. For any particular report a limited number of display modes may be used.



(a) Dot-Density

In this display, minimum and maximum cut-off levels are chosen. Any value that is below the minimum cut-off value will appear white, whilst any value above the maximum cut-off value will appear black. Any value that lies between these two cut-off levels will have a specified number of dots depending on the relative position between the two levels. The focus of the display may be changed using different levels and a contrast factor (C.F.). Usually the C.F. = 1, producing a linear scale between the cut-off levels. Assessing a lower than normal reading involves the use of an inverse plot, This plot simply reverses the minimum and maximum values, resulting in the lower values being presented by more dots. In either representation, each reading is allocated a unique area dependent on its position on the survey grid, within which numbers of dots are randomly placed. The main limitation of this display method is that multiple plots have to be produced in order to view the whole range of the data. It is also difficult to gauge the true strength of any anomaly without looking at the raw data values. This display is much favoured for producing plans of sites, where positioning of the anomalies and features is important.

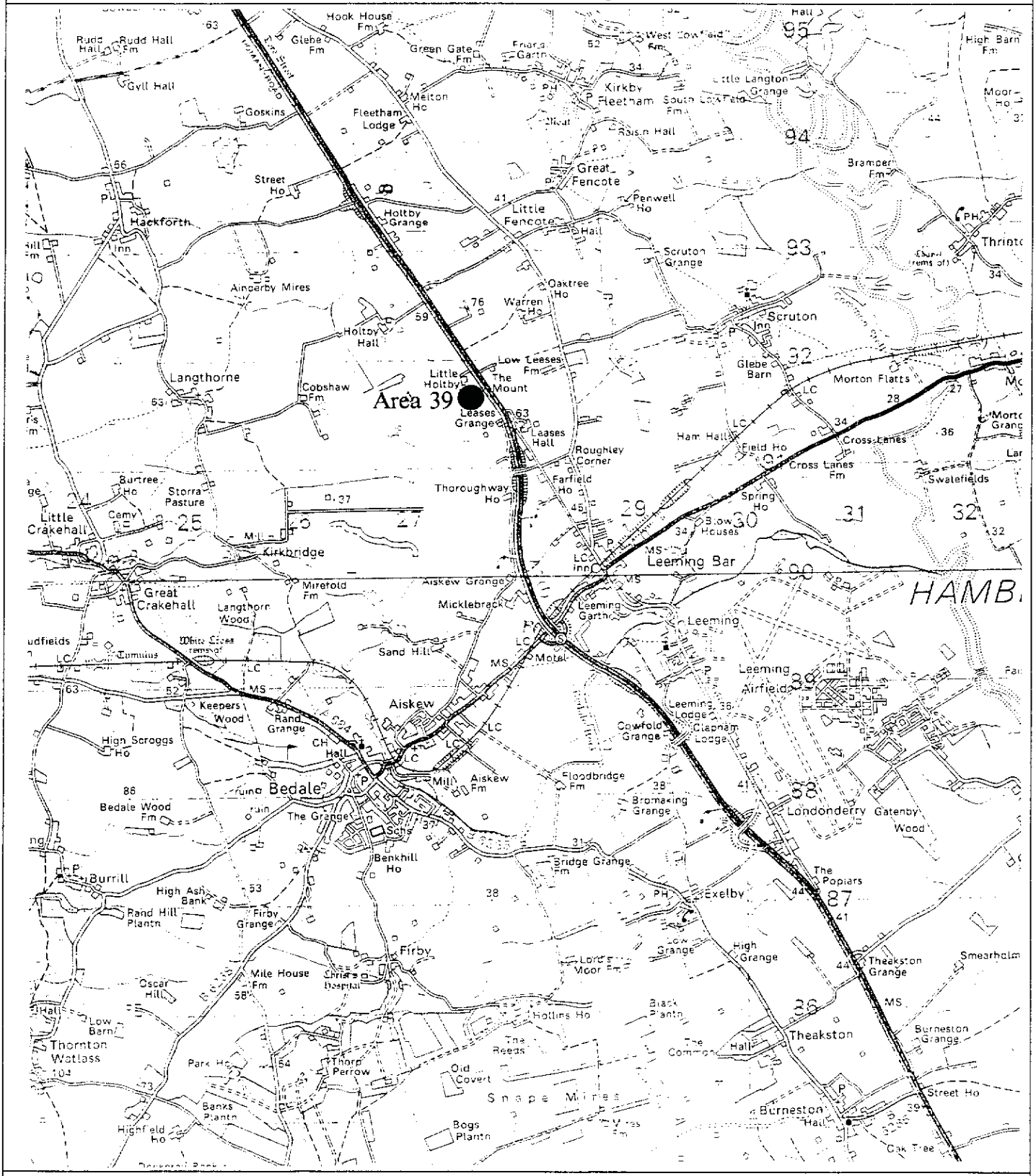


(b) X-Y Plot

This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. Advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the indiviual anomalies. Results are produced on a flatbed plotter.

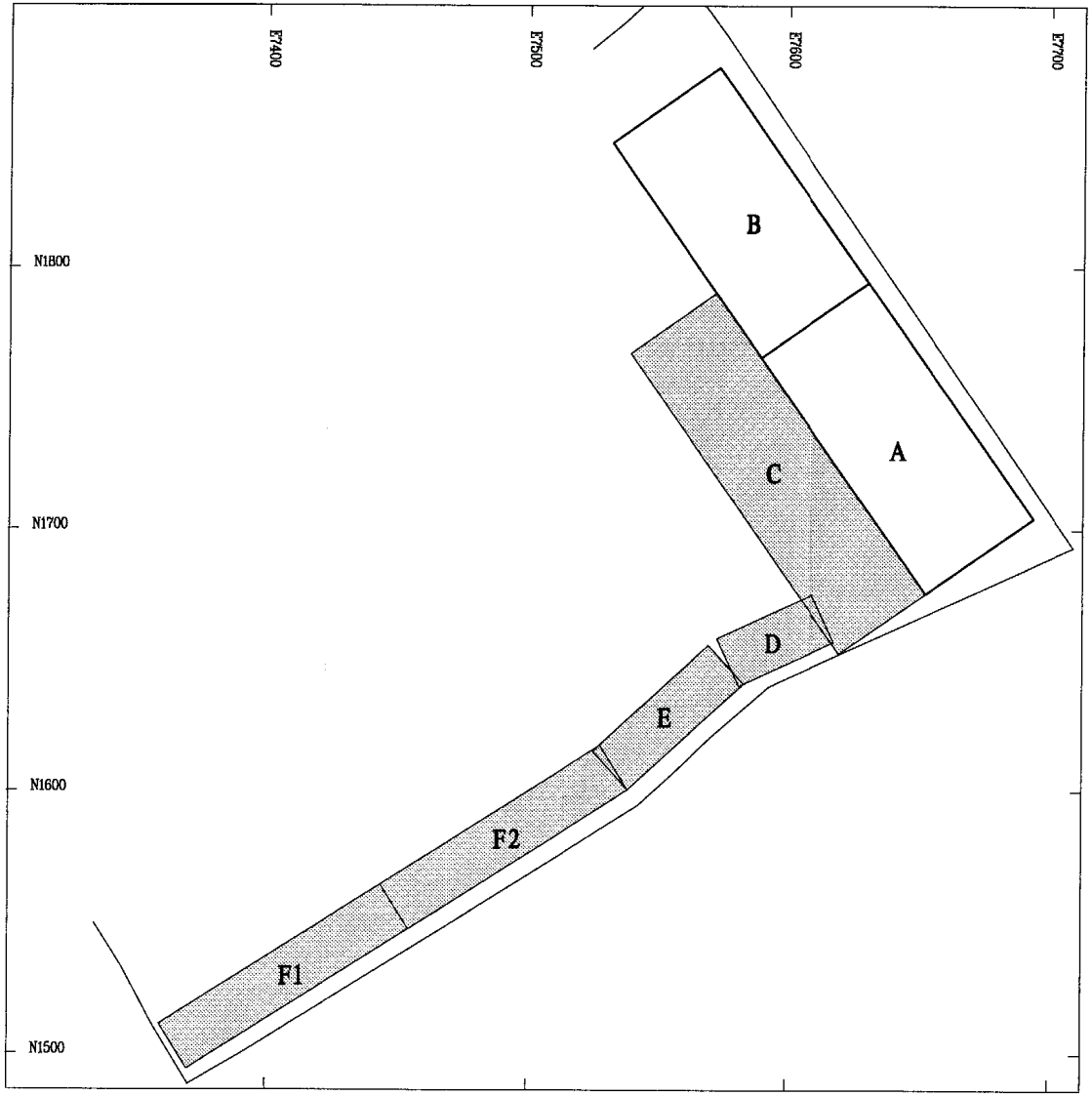
A1 DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39

Location Diagram



1:50000

Figure 1



GEOPHYSICAL SURVEYS OF BRADFORD
PROJECT: A1 DISHFORTH - NORTH OF LEEMING
TITLE: Area 39, Location of Survey Grids
Based on a plan supplied by Anthony Walker & Partners

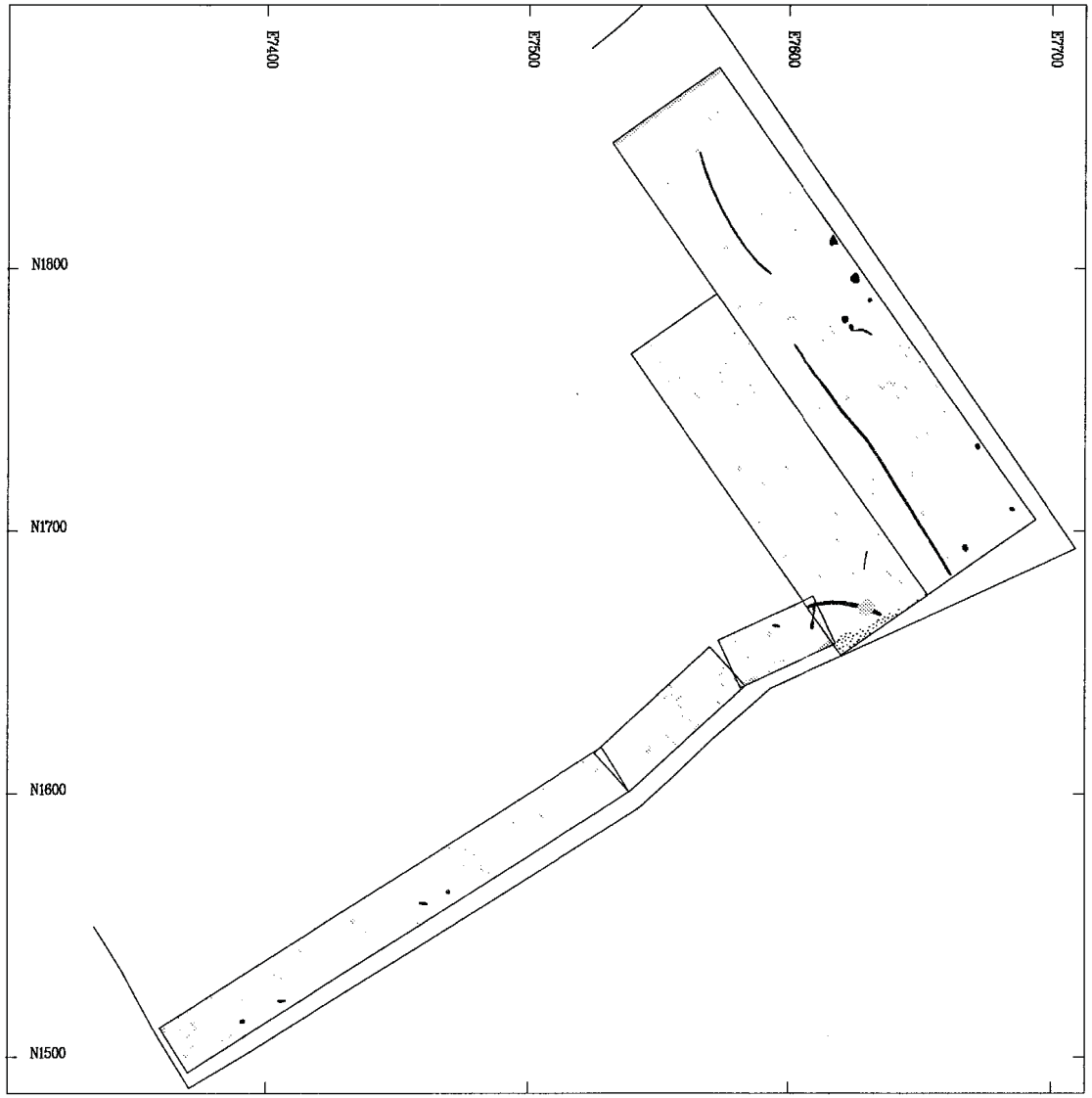
Area of previous gradiometer survey

Area of current gradiometer survey

0 metres 100

ORIGINAL AT A3

Figure 2



GEOPHYSICAL SURVEYS OF BRADFORD
PROJECT: A1 DISHFORTH - NORTH OF LEEMING
TITLE: Area 39, Summary Interpretation
Based on a plan supplied by Anthony Walker & Partners

??Archaeology

Area of magnetic disturbance

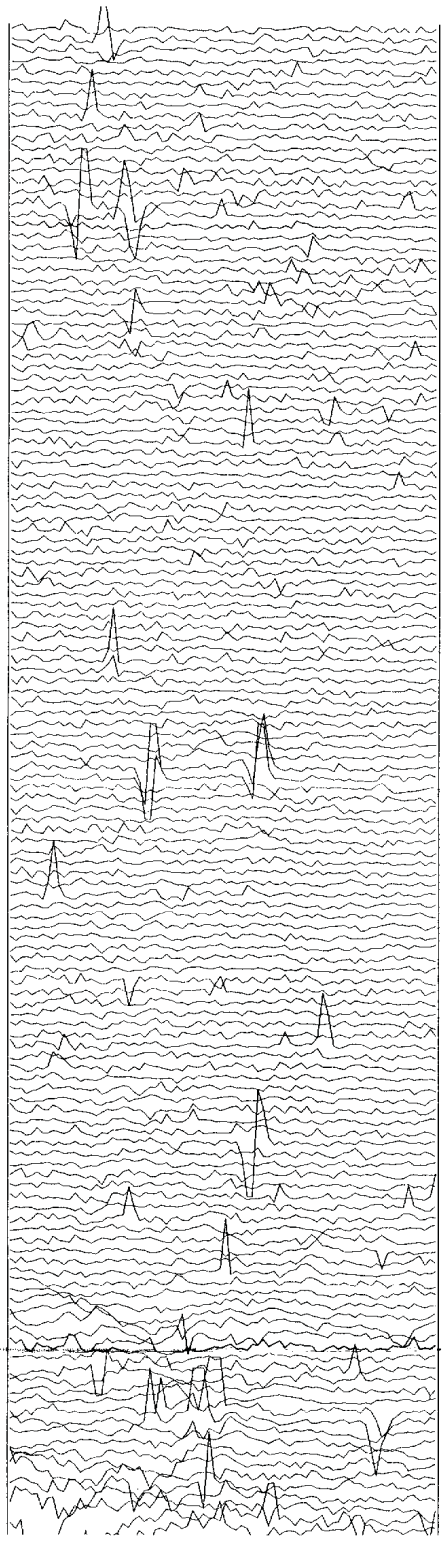
Ferrous

ORIGINAL AT A3

0 metres 100

Figure 3

A1
DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39
Area C



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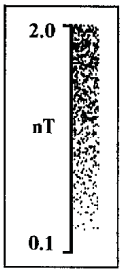
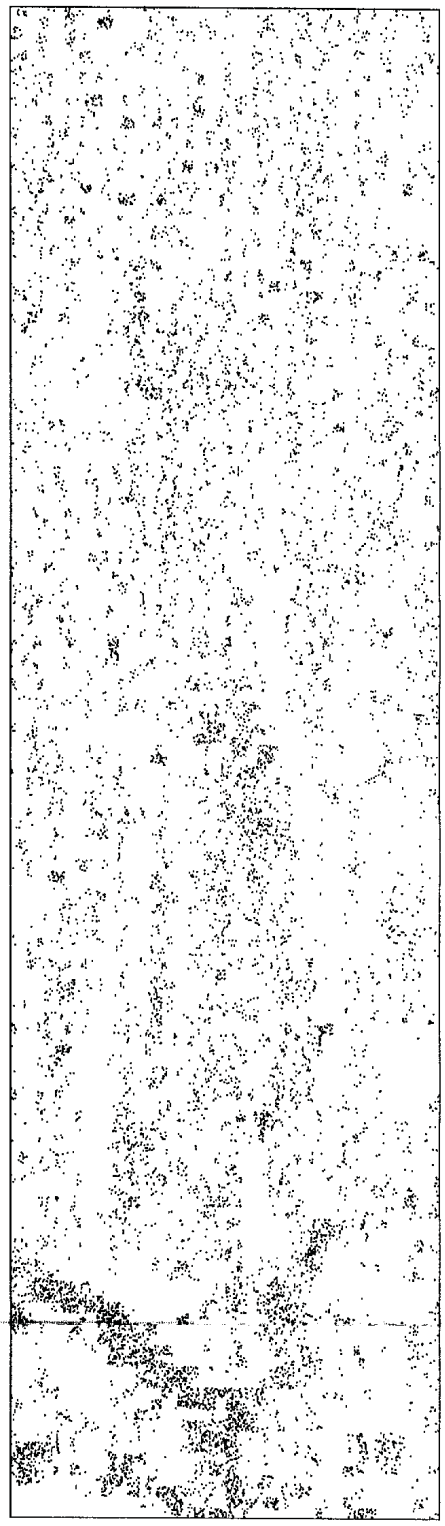


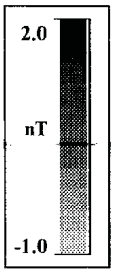


ORIGINAL AT A3

0 m 20

Figure C1

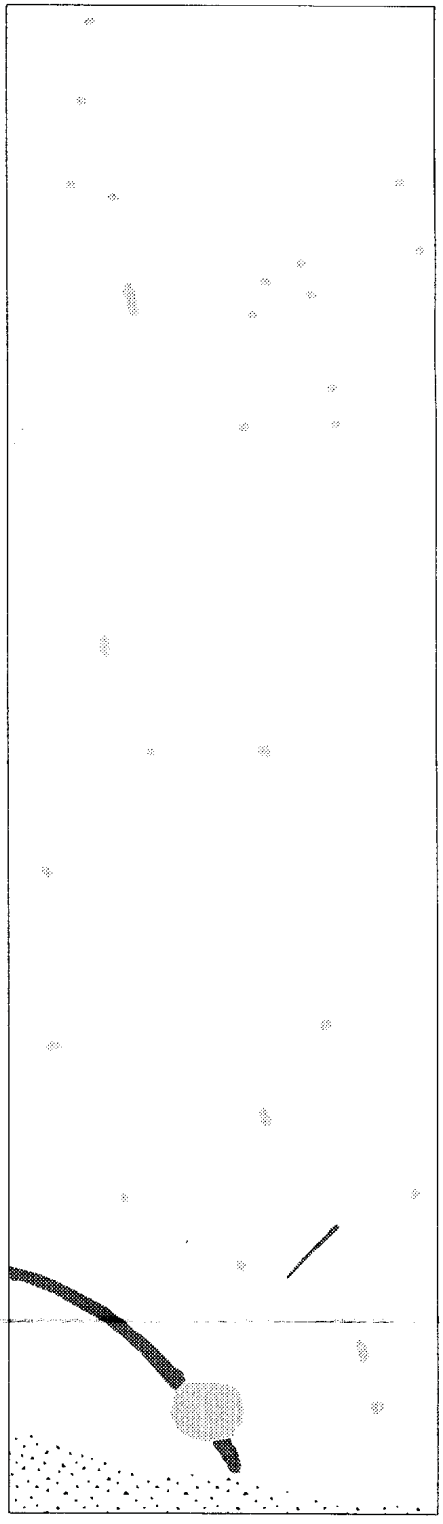
A1
DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39
Area C



??Archaeology

Area of magnetic disturbance

Ferrous

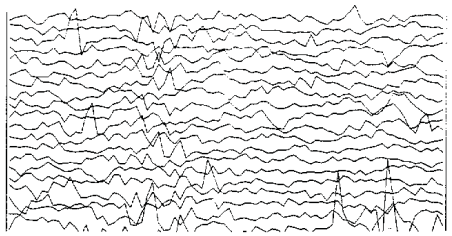


ORIGINAL AT A3

0 m 20

Figure C2

A1
DISHFORTH TO
NORTH OF LEEMING IMPROVEMENTS: AREA 39
Area D



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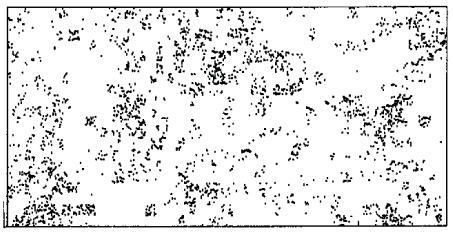
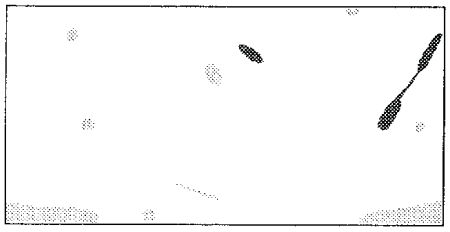


2.0
nT
0.1

2.0
nT
-1.0



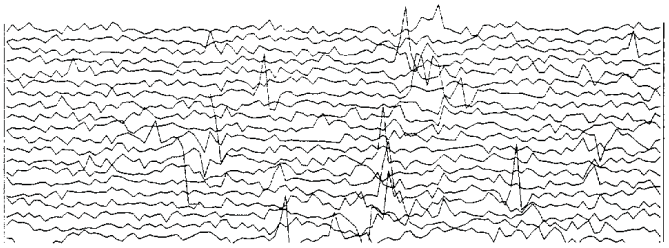
??Archaeology

Ferrous

0 m 20

Figure D1

A1
DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39
Area E



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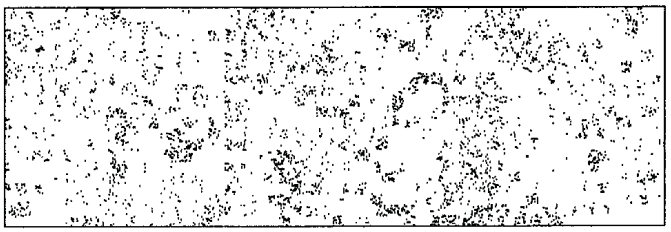

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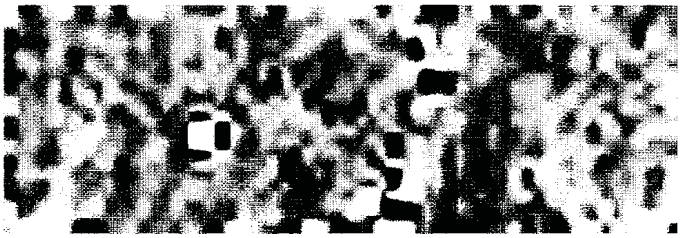


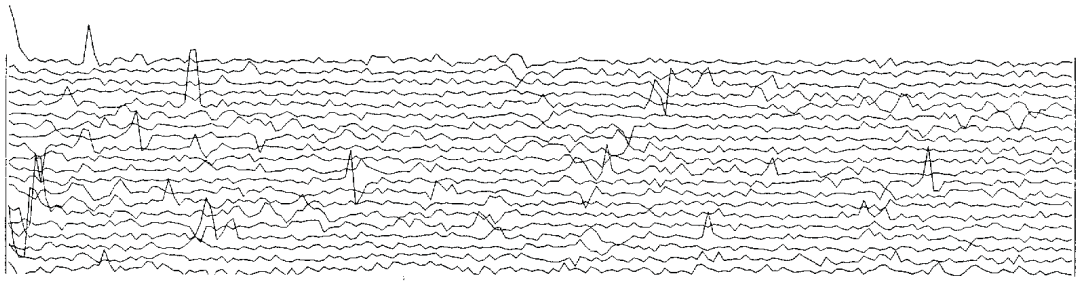
2.0
nT
-1.0

Ferrous

0 m 20

Figure E1

A1
DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39
Area F1



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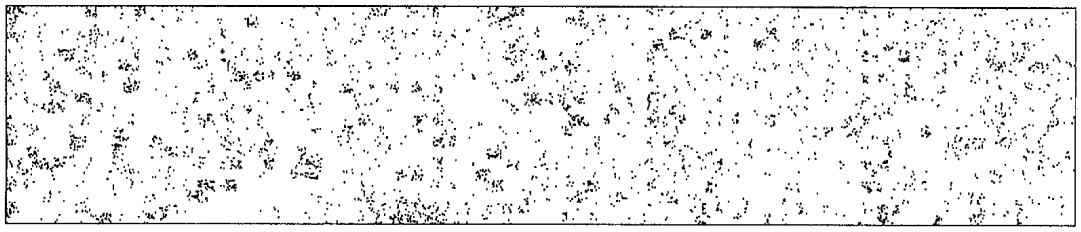
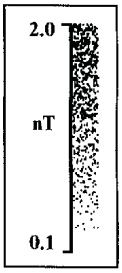
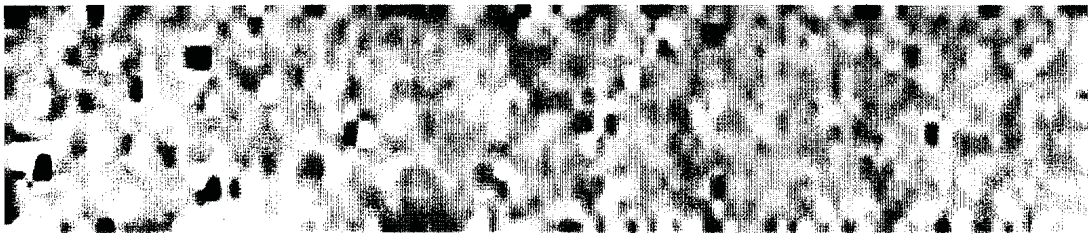
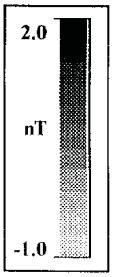








??Archaeology

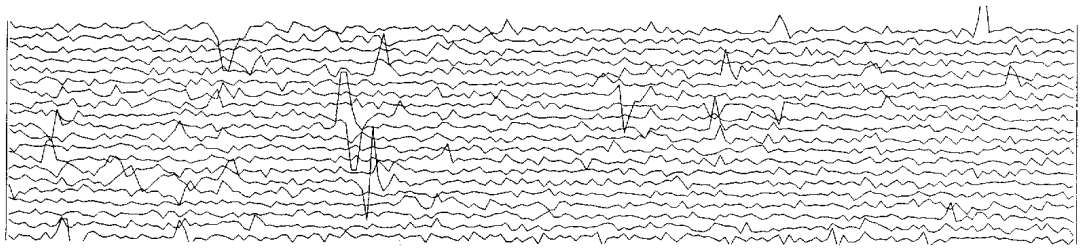
Ferrous

ORIGINAL AT A3

0 m 20

Figure F1

A1
DISHFORTH TO NORTH OF LEEMING IMPROVEMENTS: AREA 39
Area F2



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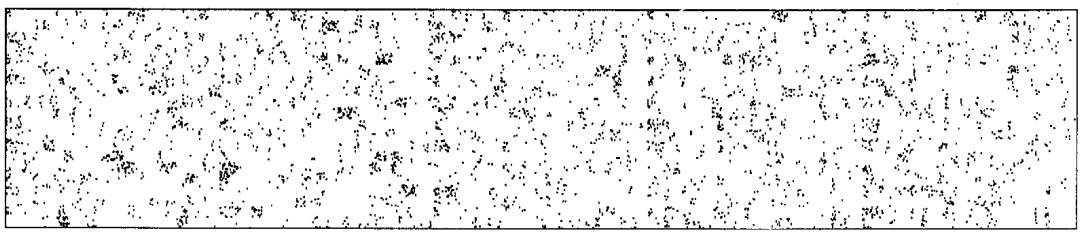

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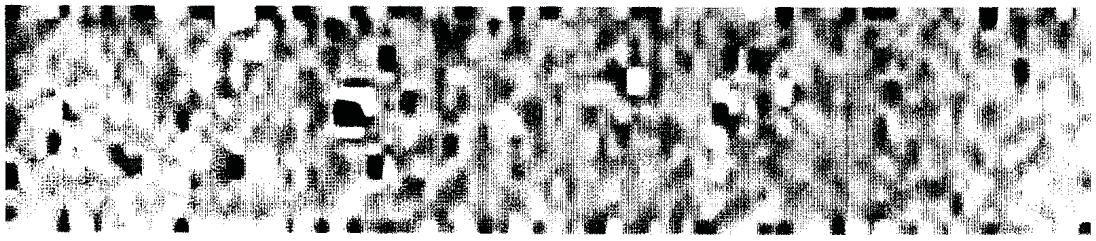

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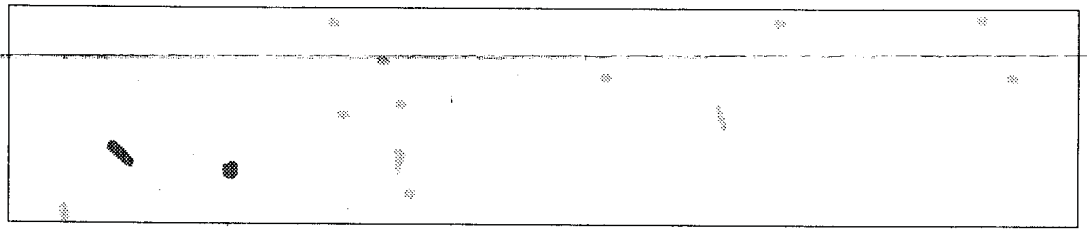

??Archaeology

Ferrous

ORIGINAL AT A3

0 m 20

Figure F2